

REMARKS

Claims 1-53 are pending in this application. Claims 1-14, 20-31 and 53 are under examination, whereas claims 15-19 and 32-52 have been withdrawn from consideration as being directed to a non-elected invention. The Office Action Summary mailed March 21, 2011, should be corrected to reflect the status of the claims in this application.

Claims 1-3, 5, 6, 8-14, 20 and 53 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Motoya et al. (JP09-187646:MOTOYA) in view of Omori et al. (U.S. Patent No. 6,689,465:OMORI). MOTOYA is said to teach an absorbent article comprising an organic polymer resin and an inorganic ion absorbing material. The Examiner recognizes that MOTOYA fails to teach that the article is porous with communicating pores opening at an outer surface, that a gap exists between fibrils that becomes a communicating pore, that fibrils have cavities in the interior of each of the fibrils, or that inorganic ion absorbing material is supported on the surface of the interior cavities. However, OMORI is erroneously relied on as disclosing a porous bead wherein at least part of the fibrils have a cavity in the interior of each fibril. The porous beads of OMORI do not have cavities formed in the interior of the fibril itself as shown in the attached electron microscope photographs prepared by Asahi Kasei Chemicals Corporation, the common assignee of the present application and the OMORI patent, which also share a common inventor (i.e., Akihiro Omori).

Figure A attached to this reply shows a comparison between the article of Fig. 1 of the present application and Figs. 3 and 7 of OMORI. The electron microscope photographs shown in Fig. A show the torn surface of the articles from which one can

observe the cross-section of the fibril forming the communicating pores. Fig. 1 of the present invention in an electron microscope photograph (magnification of 5000 times) showing the torn surface of the article of Example 2 of the present application, the gap between the fibrils becomes a communication pore, the fibrils forming the skeleton of the porous formed article have cavities in the interior of each of the fibrils itself, wherein the cavities open at the surface of the fibril.

Figs. 3 and 7 of OMORI are electron microscope photographs (magnification 10,000 times) showing the torn surfaces of the porous beads prepared in examples 1 and 2 of OMORI respectively. Though the magnification is twice as large as Fig. 1 of the present application, no cavities are found in the interior of each of the fibrils itself that form the skeleton of the porous formed article and the cavities do not open at the surface of the fibril.

Fig. B attached to this reply shows Fig. 13 of OMORI (magnification of 3000 times) and an enlarged image thereof (magnification of 15,000 times), illustrating the torn surface of porous beads prepared in accordance with example 3 of OMORI. From this Fig. 13 of OMORI, it is confirmed that the polymer fibrils are entangled in a complicated manner to form a three-dimensional network structure in the bead as described at col. 27, lines 16-24 of OMORI. No cavities are observed in the interior of each of the fibrils itself, even when the image is enlarged an additional 5 times.

Contrary to the Examiner's bare allegation and speculation, there is no disclosure in OMORI that at least part of the fibrils have a cavity in the interior of each fibril in the Abstract, Fig. 13, col. 4, lines 52-57, or any other location in OMORI. The comparative electron microscope photographs of representative examples of the present application

and the disclosure in OMORI confirm the difference in the porous articles formed, and the absence of a cavity in the interior of each of the fibrils itself in the OMORI article as required by the present claims. Accordingly, this rejection should be withdrawn.

The Examiner also has erroneously asserted that the method of producing the porous polymeric beads described in OMORI (col. 16, lines 37-61) would necessarily lead to the formation of not only a porous bead, but also a porous fiber making up that bead. Again, this conclusion is incorrect and improper speculation on the part of the Examiner. The production process disclosed in OMORI does not produce cavities in the interior of each of the fibrils in the porous formed article.

The production process disclosed in OMORI includes:

- (a) mixing, while heating, an organic polymer resin with a solvent to obtain a resin solution,
- (b) dispersing the resin solution in a non-solvent to obtain a dispersion,
- (c) cooling the dispersion to solidify the organic polymer resin, and
- (d) separating the solidified resin.

In other words, this production process utilizes a temperature phase separation.

According to such a temperature phase separation process, the organic polymer resin is dissolved in the solvent at high temperatures and then cooled to be subjected to phase separation, which results in a porous structure. A single kind of solvent is only used in this process. Therefore, the resulting communicating pore is one kind of morphology of pore which is a trace formed by allowing the solvent to be removed. Accordingly, no cavities can be formed in the interior of each of the fibrils itself of the produced porous beads.

In contrast, the production process according to the present invention includes immersing a mixture of a polymer, a good solvent for the polymer, and a water-soluble polymer with a poor solvent to exchange the solvents with each other and thereby gel the polymer, which results in the production of a porous formed article. In this process, the organic polymer resin dissolved in the good solvent is subjected to phase separation in the poor solvent, which results in the production of porous structures. This process utilizes two kinds of materials, that is, the solvent and the water-soluble polymer. Therefore, there are produced two kinds of different morphologies of pores, that is, the communicating pores which are traces of removal of the solvent and the cavities in the interior of each fibril (skeleton) which are traces of the removal of the water-soluble polymer.

Fig. C, attached hereto, indicates that cavities are formed in the interior of each of the fibrils itself by adding the water-soluble polymer. Fig. C provides a comparison between the electron microscope photograph showing the torn surface of a formed article in Example 2 of the present application (FIG. 2 of the present application) and the electron microscope photograph showing the torn surface of a formed article in Comparative Example 1 of the present application. These two photographs were both taken with a magnification of 10,000.

In Comparative Example 1, a porous formed article was prepared without using a water-soluble polymer (paragraph [0047] of the present specification) and had no cavities at all in the interior of the fibril itself as seen from Fig. C. In contrast, in Example 2, a porous formed article was prepared by using a water-soluble polymer and had cavities in the interior of each of the fibrils itself, which cavities open at the surface

of the fibrils. In other words, the cavities in the interior of each of the fibrils itself are formed by using the solvent and also the water-soluble polymer.

In summary, the production process of a porous formed article of OMORI uses a temperature phase separation, employs a single kind of solvent and forms no cavities in the interior of each of the fibrils itself.

Neither MOTOYA nor OMORI describes allowing the resin to be subjected to phase separation by using a poor solvent to produce the porous formed article. Neither of these references describes or suggests adding the water-soluble polymer. Accordingly, neither MOTOYA nor OMORI, alone or in combination, describes a process to produce a porous formed article according to the claimed invention.

The claimed porous formed article is also distinguished from the teachings of MOTOYA and OMORI in requiring that the inorganic ion absorbing material is supported both on the outer surface of the fibril and on the surface of the inner cavities. MOTOYA describes attaching a binder and an absorbing material to each other by impregnation method, dropping method, and spray method (paragraph 0009 on page 5) as a method of attaching the absorbing material to the three dimensional network structure. This clearly means that the absorbing material can only be attached to the surface of the fibril and cannot be attached to the interior of each fibril. Similarly, the absorbing material could not be attached to the surface of the inner cavities in OMORI because, as explained above, the fibrils of OMORI do not have inner cavities. The production method of the present invention leads to a resultant porous article that is not achieved by either MOTOYA or OMORI, alone or in combination. Accordingly, the rejection should be withdrawn for this additional reason.

Claim 4 has been rejected under 35 U.S.C. § 103 as being unpatentable over Motoya in view of Omori and Chang et al. (U.S. Patent No. 5,418,284).

Claim 7 has been rejected under 35 U.S.C. § 103 as being unpatentable over Motoya in view of Omori and Cheremisnoff.

Claims 21-31 have been rejected under 35 U.S.C. § 103 as being unpatentable over Motoya in view of Omori and further in view of Kazuhiko (JP 2003-305458).

These rejections should be withdrawn for at least the same reasons discussed above with respect to claim 1. None of the additional references relied on in these rejections provide any reason or motivation to modify the teachings of Motoya and/or Omori in such a way that would produce a porous formed article according to the claimed invention having fibrils forming a three-dimensional network structure that contains both a gap between fibrils forming a communicating pore, and cavities in the interior of each fibril itself.

Applicants respectfully request that the Examiner withdraw the rejections of each of claims 1-14, 20-31, and 53 under 35 U.S.C. § 103.

Prompt and favorable reconsideration is requested.

Please grant any extensions of time required to enter this response and charge any additional required fees to Deposit Account No. 06-0916.

Respectfully submitted,

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Dated: June 20, 2011

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Attachment: Figs. A-C